# Cisco Catalyst 4500 – What's New

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# Agenda

Campus Trends and The Cisco Network Fabric

Catalyst 4500 Hardware

Virtualization Update

Collaboration Update

Operations Update

Summary


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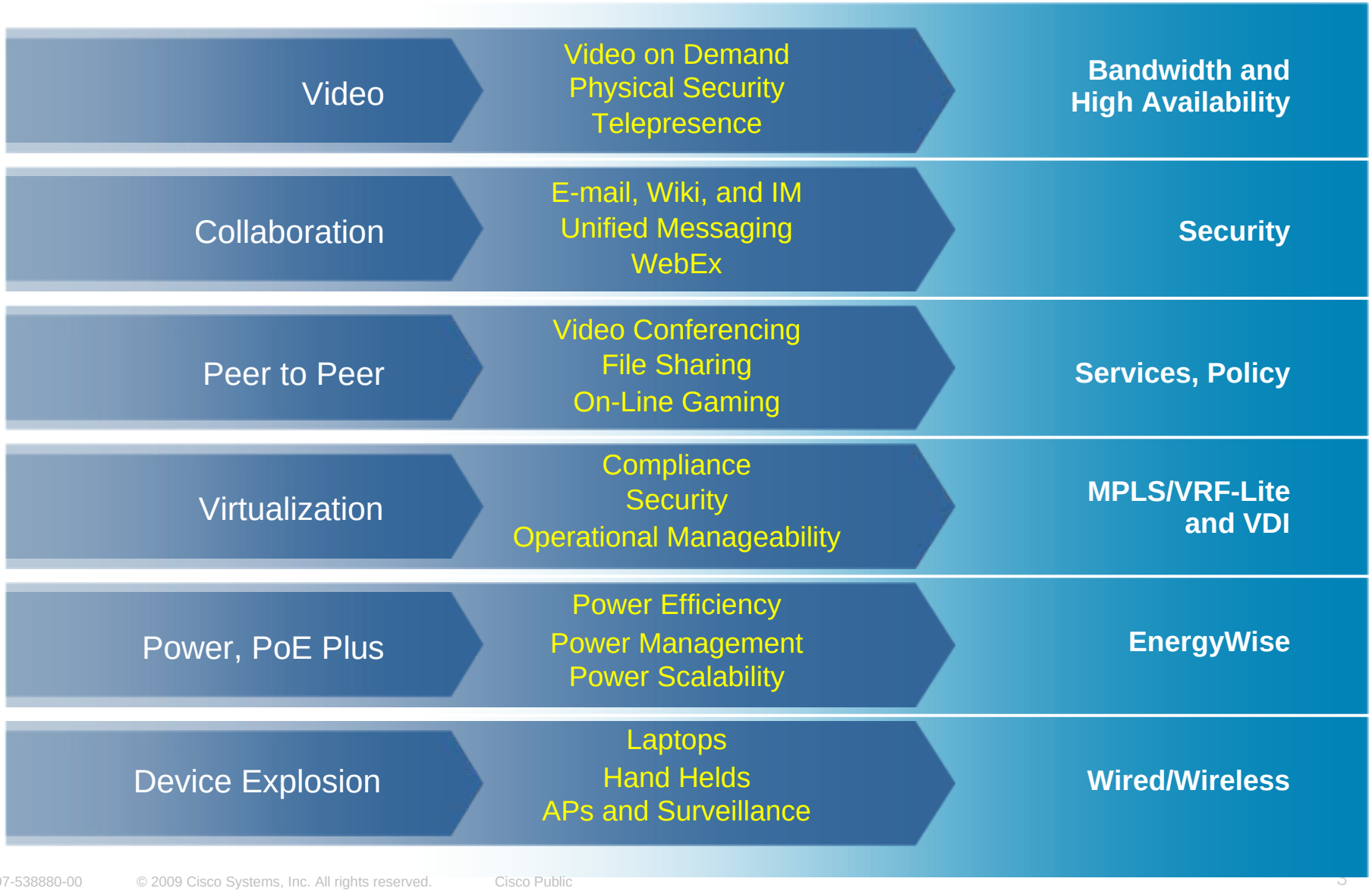
# Trends Driving New Campus Challenges





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# It’s a New World…for Businesses

**New Worker Model**
Tech-Centric Millennial
Virtual, Mobile
Collaborative, Video

**New Operating Model**
Global
Collective Decision Making
Strict Governance

**New Resource Model**
Maximum utilization
Energy efficiency
Low TCO

Driving New Technology Model

Virtualization

Collaboration

Operations

Resilient, Secure, and Scalable Foundation

**Cisco Network Fabric**


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# Cisco Catalyst 4500 Series

## Innovation and Investment Protection for Converged Networks

Cisco® Catalyst® 4500 Series

Product Of The Year 2008 Unified COMMUNICATIONS

530,000+ chassis shipped

70+ million ports shipped

### Drives Virtualization

- Desktop Virtualization
- VRF-lite
- Non-stop communications

### Enables Collaboration

- PoEP ready
- Mobility
- MediaNet

### Optimizes Operations

- Automatic Management
- Energy Efficient
- Low TCO


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# Catalyst 4500 E-Series Chassis

## Foundation Platform for Cisco's Network Fabric

**Performance**—48 Gbps/slot ready

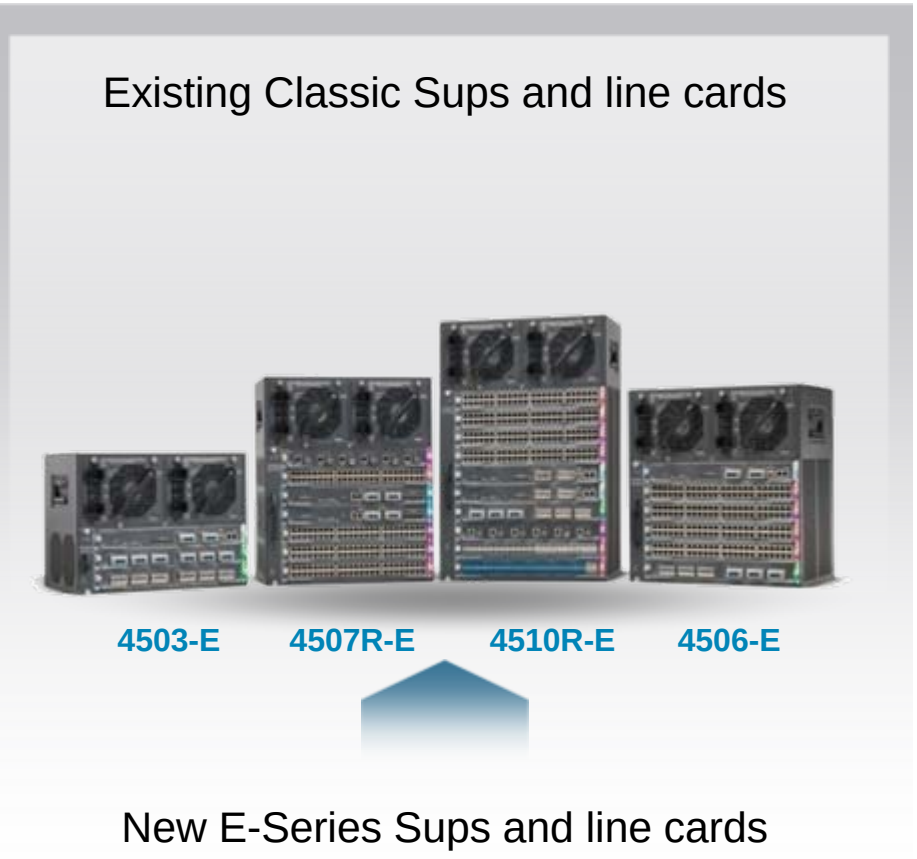
- Enables high performance E-Series line cards (24Gbps/slot)
- Low power with Idle slot power optimization

**Scale**—Up to 384 10/100/1000 PoE and PoEP-ready ports or 34 10GbE ports

- Higher power (1300W) per line card slot; ready to support PoEP

**Investment Protection**—Supported with all software releases (backward and forward compatible)

- Compatible with all shipping Supervisors, line cards and power supplies
- Mix and match Classic and E-Series line cards in same chassis




High Performance PoEP-Ready Platform with Investment Protection

# Catalyst 4500 E–Series Supervisors

## Performance and Next Generation Services with Investment Protection

### Enhanced L3

- Enterprise Services IOS
- IP Base IOS

WS-X45-SUP6-E

VRF Lite, FHRP,
OSPF, BGP, EIGRP,
IPSLA, NMSP

### Basic L3

- IP Base IOS

New

WS-X45-SUP6L-E

PVST+, Bi-dir PIM
CoPP, ISSU, SSO
EIGRP-Stub, EnergyWise
SMART Call Home, EEM,
Smartports, FlexLink

E-Series Supervisors: 24-Gbps/Slot, TwinGig Uplinks,
Back Compatible with Classic LCs

# Supervisor Engine 6-E

**Shipping Since 11'07**

**WS-X45-Sup6-E**

- Converts X2 10GE interface into dual SFP interfaces
- Enables transition from 1GE to 10GE

Ships Standard with Sup6-E

- 250 Mpps centralized forwarding
- Enables 320 Gbps at 24Gbps/slot
- Full IPv6 support in hardware
- Two active 10GE X2 ports
- 128K "flex" security/QoS
- 256K routing entries

Supported in all "Classic" and "E-series" Chassis
Supports a Mix of Classic and E-Series Linecards

# Introducing Catalyst 4500 Supervisor Engine 6-E Lite

## Performance and Next Generation Services with Investment Protection

**WS-X45-SUP6L-E**

New

### Enhances Services

- **Security—**Identity based security and flexible authentication. NAC and TrustSec (software) support for compliance. CoPP to protect against attacks
- **PoE Plus Ready—**30W/ port on E-series and classic line cards to power new devices
- **Resiliency—**Minimum downtime SSO/NSF/ISSU (7R chassis)

### Enables Collaboration

- **Performance**—24G/ slot, 280 Gbps Switch Fabric Capacity, IPv4 (225Mpps), IPv6 (112Mpps) in H; 64K FIB entries, 32K security/QoS, 4K VLAN/SVI Support, Superior multicast for video
- **Memory**—512 MB and 1 GB SDRAM options
- **Uplinks**—2 active 10GbE ports or 4 active SFPs in redundant mode

### Optimizes Operations

- **Backward Compatible—** E series and Classic linecards and chassis
- **Flexibility**—Twin Gigabit connectors for 10G migration
- Power optimized—Low power consumption; support for EnergyWise
- **Automatic management—** EEM, SmartPorts for deployment, SmartCall Home Support

IP Base (Basic L3) and LAN Base* IOS images—12.2(52)SG * LANBase Image available only with bundles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# Catalyst 4500 Supervisor Comparison

| Features | SupV-10GE* | Sup6L-E | Sup6-E |
|---|---|---|---|
| Switch Fabric Capacity | 136 Gbps | 280 Gbps | 320 Gbps |
| CPU | 800 MHz | 1 GHz | 1.3 GHz |
| Forwarding Rate | 101 Mpps | 225 Mpps | 250 Mpps |
| VLANs, SVIs Supported | 4,096 | 4,096 | 4,096 |
| Number of Routes | 128,000 | 64,000 | 256,000 |
| ACL Entries (Input + Output) | 32K | 32K | 64K |
| Chassis Support | 3, 6, 7R, 10R, chassis | 3, 6, 7R chassis | 3, 6, 7R, 10R chassis |
| Active redundant 10G uplinks | 2 | 2 | 4 |
| Max DRAM | 512 MB | 1GB (option) | 1GB (option) |
| USB ports available | No | No | Yes |

* Supports Netflow


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# Catalyst 4500—10/100/1000 Line Cards

## Leadership with Investment Protection

PoE Plus* Linecards

New

**WS-X4548-RJ45V+**

- Classic (6G/ slot) 48 port 10/100/1000 RJ45 card
- 30W/ port on upto 24 ports
- Re-use existing chassis, power supplies, Supervisors
- PoE policing and monitoring
- EnergyWise

**WS-X4648-RJ45V+E**

- E-Series (24G/ slot) 48 port 10/100/1000 RJ45 card
- 30W/ port on upto 24 ports
- Re-use existing chassis, power supplies, Supervisors
- PoE policing and monitoring
- EnergyWise
- Jumbo frame support

Data

**WS-X4548-GB-RJ45**

Red = Differentiators

***IEEE802.3at standard PoE-Plus expected Sept 09**

| 6G (Classic) | 24G (E-Series) |
|---|---|


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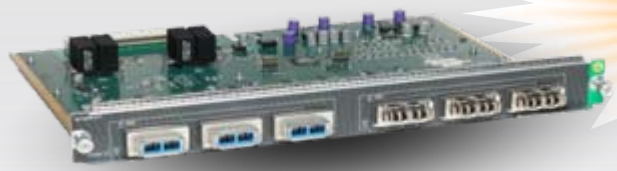
# Catalyst 4500 E-Series Core/Distribution Line Cards

## WS-X4606-X2-E



**Shipping Since Nov ’07**

- 6-Port 10GE Line card
- Support 6 X2 optics
- Supports twin-gig modules

## WS-X4624-SFP-E

**Shipping Since May ’08**

- 24-Port SFP Line Card
- Supports all GE SFP optics
- Line rate on all ports

24GB/Slot Linecards—Mix with Classic Cards with No Performance Hit

# Catalyst 4500 PoE Power Supplies

| | Input Circuits | Voltage | Circuit Power | PoE Power | Class 3 PD (Max) | 30W PD (Max) |
|---|---|---|---|---|---|---|
| PWR-C45-1300ACV | Single | 110V/220V | 1000W | 800W | 48 | 48 |
| PWR-C45-2800ACV | Single | 220V | 1360W | 1400W | 84 | 43 |
| PWR-C45-4200ACV | Dual | 110V/220V | 1383W | 3700W (220V)<br>1850W (110V) | 223 (220V)<br>111 (110V) | 114 |
| New PWR-C45-6000ACV | Dual | 110/220V | 2200W | (220V)<br>1850W (110V) | 289 (220V)<br>111 (110V) | 148 |

Compatible with E-Series and Classic Chassis
All Catalyst 4500 Chassis support 1+1 Power Redundancy

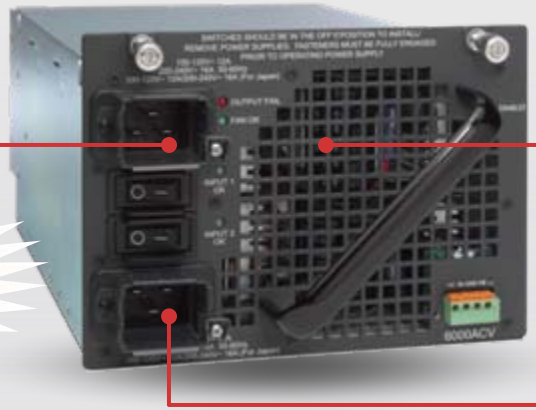
# Catalyst 4500 6000 Watt PoEP Power Supply

## Efficient, Flexible, Scalable, Protects Investment

### Flexible and Scalable

- Auto-sensing 110V (15A) /220V (20A)
- Up to 2800W Data and 4200W PoE(P) Power
- 1:1 Redundancy
- Powers fully loaded 4507R-E Chassis with Class 3 devices

New



### Energy Efficient

- Highest average efficiency rating for Catalyst 4500 series power supplies
- Measures true power consumption, integrates with EnergyWise

### Investment Protection

- Dual Input power supply scales with growth in power needs
- Compatible with E-Series and classis chassis

| Input Voltage | Line Connected | Output Power | Max # Poe PD (Class 3) | Max # PoEP PD (30W) |
|---|---|---|---|---|
| 220 VAC | Both | 6000 W | 289 | 148 |
| | Single | 3000 W | 144 | 74 |
| 110 VAC | Both | 2100 W | 111 | 57 |
| | Single | 1050 W | 55 | 28 |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# Cisco Catalyst 4500

## Access Portfolio Summary

| | Basic L3 | Enhanced L3 |
|---|---|---|
| 24G | WS-X45-SUP6L-E | WS-X45-SUP6-E |
| 6G | | WS-X4516-10GE (Netflow Capable) |

| | Data Only | PoEP Ready |
|---|---|---|
| 24G | | WS-X4648-RJ45V+E |
| 6G | WS-X4548-GB-RJ45 | WS-X4548-RJ45V+ |

## Cisco® Catalyst® 4500 Series

**High Performance PoEP Ready Modular Platform**

PoE Power Supplies

PWR-C45-1300ACV PWR-C45-2800ACV PWR-C45-4200ACV PWR-C45-6000ACV


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# Catalyst 4500—Warranty Policy Change

## Continuous Improvement to Address the Evolving Customer Needs

| | Old | Current | Change |
|---|---|---|---|
| Hardware | 90 Day | LLW | Increased Entitlement |
| LAN Base | 90 Day | Lifetime<br>Available on Guest Access | Increased Entitlement Image Is Made Available as Guest Access |
| IP Base* | 90 Day | Lifetime<br>Available on Guest Access | Increased Entitlement Image Is Made Available as Guest Access |
| Enterprise Services | 90 Day | 90 Day | None |

**All Individual Components or Configured Systems Purchased after May 1st, 2009 Will Have Limited Lifetime Hardware Warranty**

*** LAN Base to IP Base upgrade licence required**


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# LLW and Service Contract Comparison

## Different Service Levels to Meet Customer Needs

| | | LLW[1] | Cisco® SMARTFoundation Service | Cisco SMARTnet Service |
|---|---|---|---|---|
| HW | Duration | Limited Lifetime (5 Years for Power Supply and Fan tray) | Renewable Contract | Renewable Contract |
| | Replacement | 10 Days | Next Business Day* | Next Business Day* |
| | Cisco TAC Support | None | 8 AM – 5 PM | 24x7* |
| SW Updates | LAN Base<br>IP Base | Lifetime bug fixes and minor enhancements | Bug fixes and minor enhancements for the life of contract | Bug fixes and minor enhancements and upgrades for the life of contract |
| | Enterprise Services | Lifetime bug fixes and minor enhancements | Bug fixes and minor enhancements for the life of contract | Bug fixes and minor enhancements and upgrades for the life of contract |

*** Best Case. Actual Depends on Contract**

**1 LLW policy consistent with other Cisco Catalyst platforms including Cat3xx and Cat2xx**

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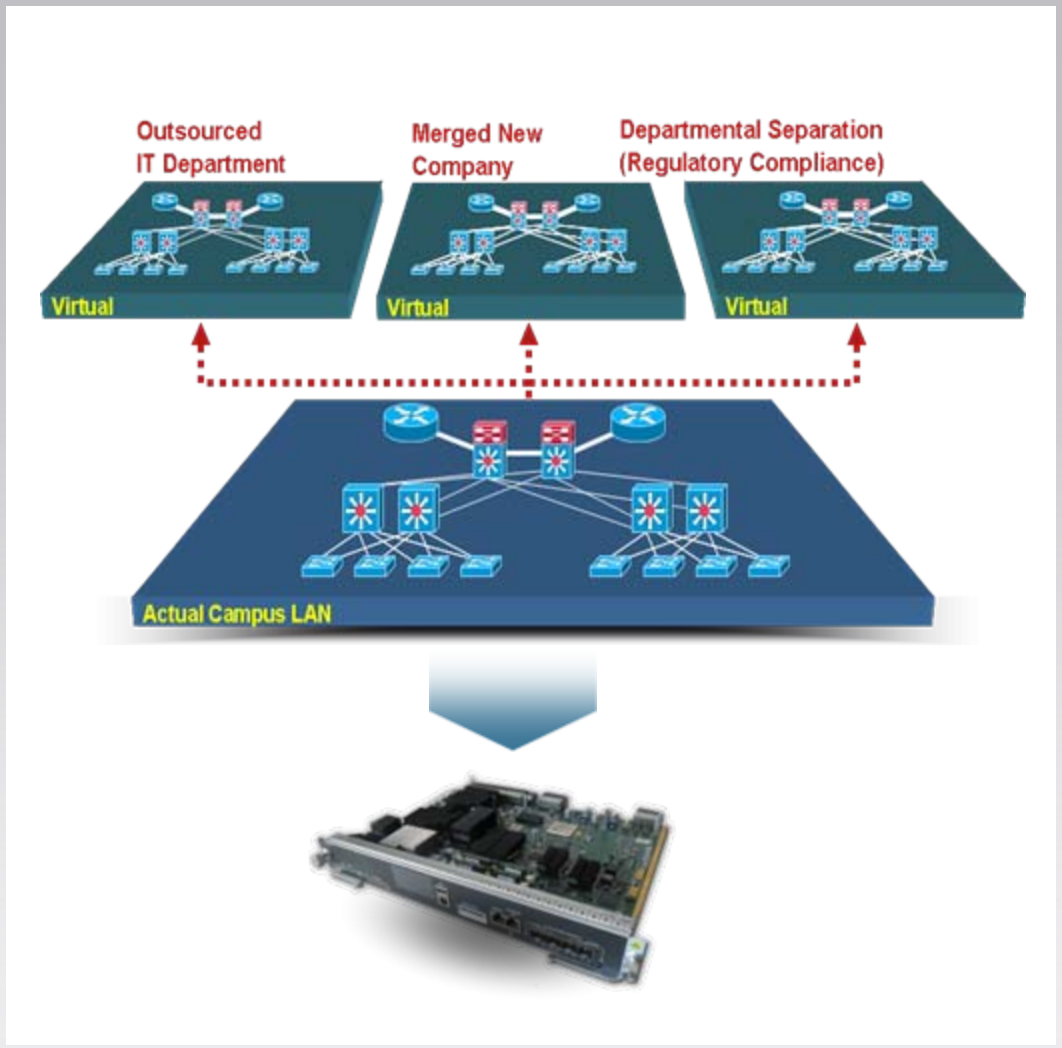
# Catalyst 4500 Network Virtualization




## Business Drivers

- Infrastructure consolidation
- Compliance and security concerns
- Partner access to resources

## Benefits:

- Lower capital and operating costs
- Improved resource and service utilization
- Shared infrastructure

## Catalyst 4500 Solutions

- Authenticate client to provide differentiated access policies
- VRF-Lite and VRF-aware services to provide traffic segmentation over layer 3 infrastructure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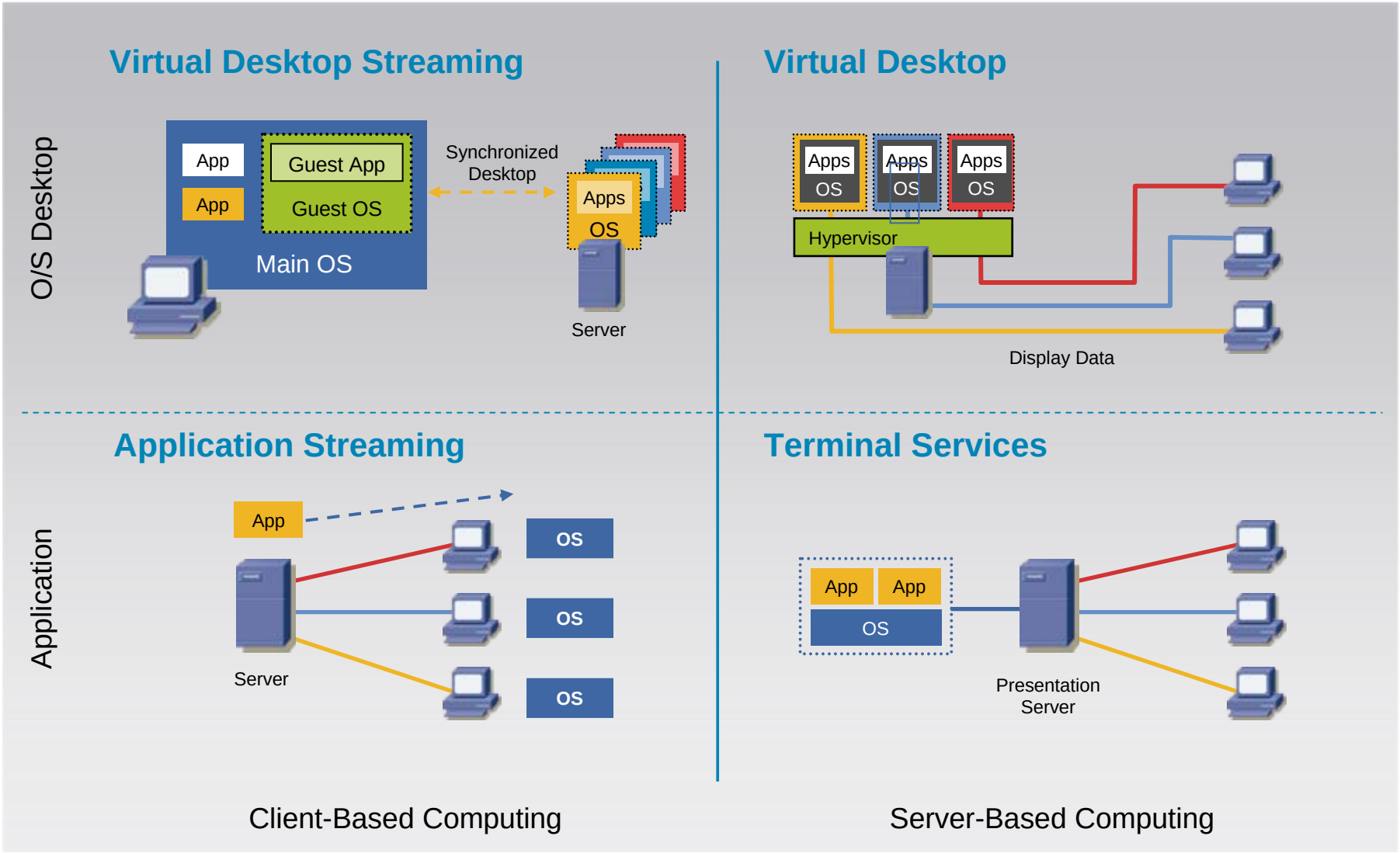
# Virtual Computing Architectures





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# Virtual Computing Architectures

O/S Desktop

Application

## Virtual Desktop Streaming

**Example:**

- VMware View
- Moka5 LivePC
- Microsoft acquired Kidaro

## Virtual Desktop

**Example:**

- VMware VDI
- Citrix XenDesktop
- Qumranet (acquired by RedHat)
- Microsoft acquired Calista

## Application Streaming

**Example:**

- Microsoft SoftGrid
- Symantec SVS + AppStream
- Citrix Application Streaming

## Terminal Services

**Example:**

- Microsoft Windows Terminal Services
- Citrix Presentation Server/XenApp

Client-Based Computing

Server-Based Computing


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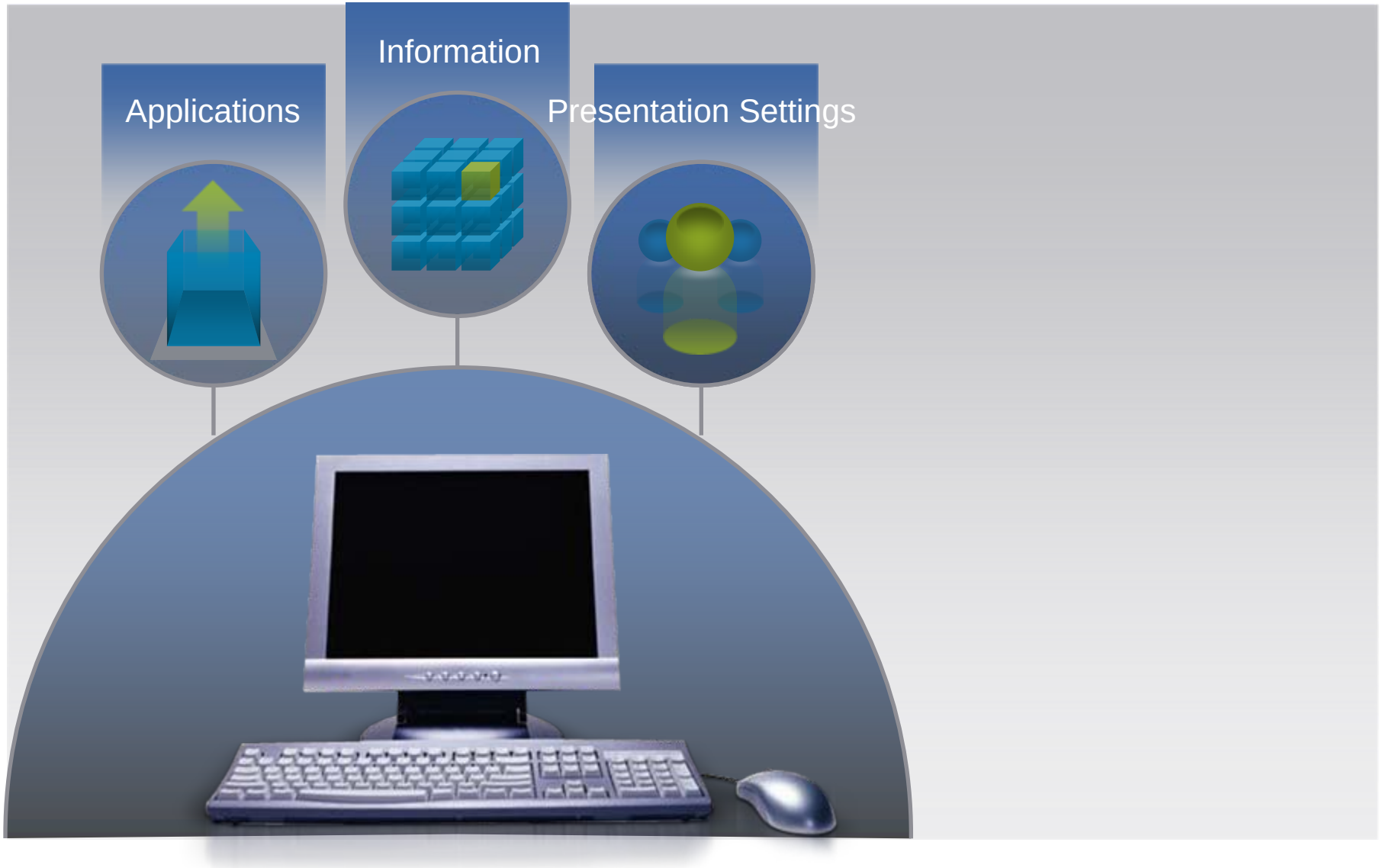
# Optimizing Desktop Virtualization Delivery





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# Optimizing Desktop Virtualization Delivery

## Campus LAN Considerations

- Non-stop communication to ensure VDI delivery NSF/SSO, ISSU…
- PoE and PoEP for IP phone, future thin client and display terminals
- Wired LAN identity to prevent unauthorized rogue device


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Catalyst 4500 Roadmap and Strategic Direction

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# Upcoming PoEP Standard and Devices

**New** Standard—IEEE802.3at for 30W/Port

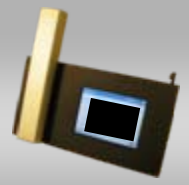
Industry First

30W Capable TODAY!

WS-4548-RJ45V+

WS-X4648-RJ45V+E

Next Gen PoEP Devices Expected CY2009 Onwards



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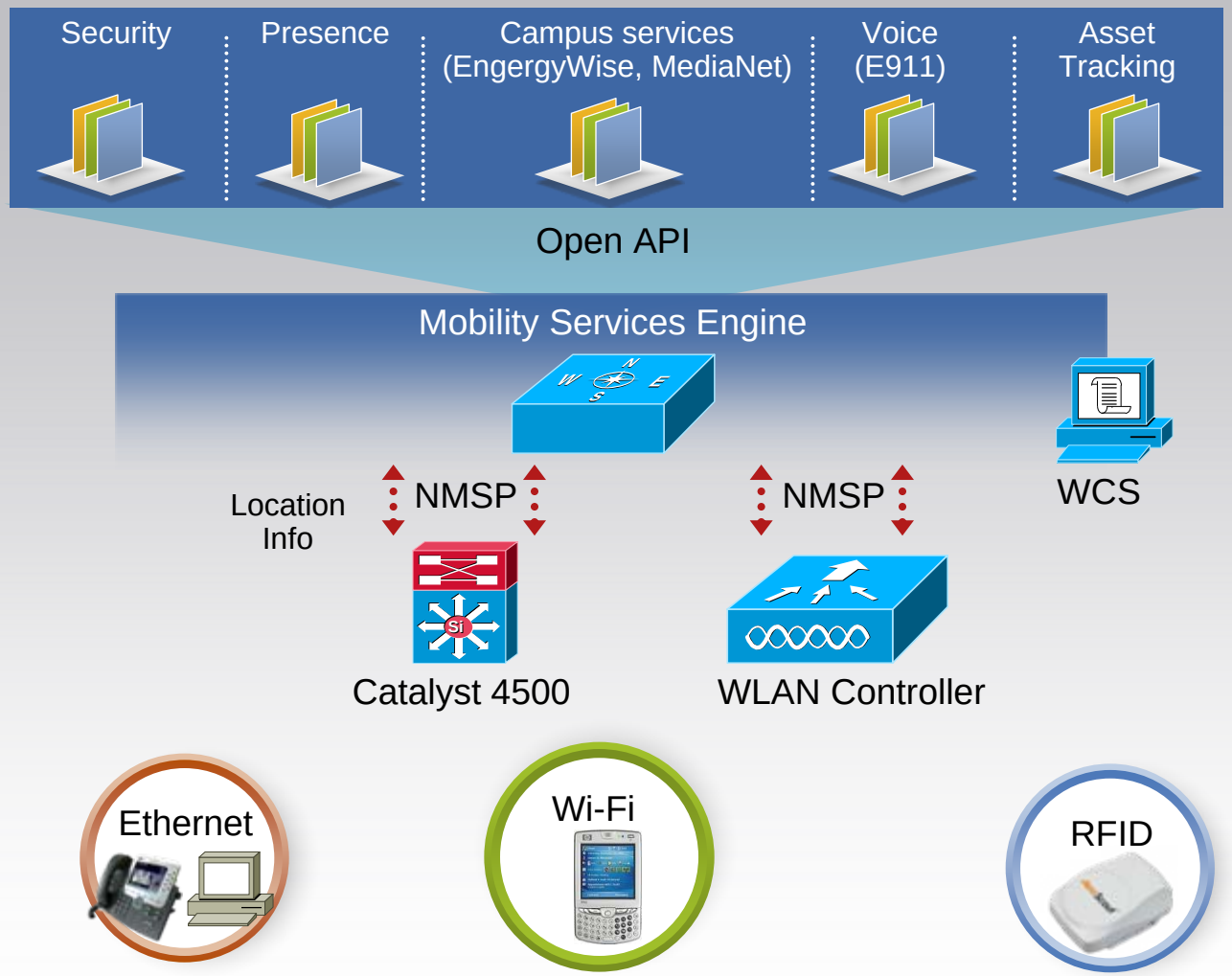
# Unified Campus Location Services

## Seamless Across Wired and Wireless Endpoints




- Determine Location of intruder getting access to network (wired and wireless)
- Track assets (wired and wireless)—central inventory for audits and compliance
- Enable collaborative applications—Location integrated with presence, MediaNet, etc.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# Catalyst 4500 Integrated Security

## Mitigate Security Threats

### Identity-Based Networking (802.1x)

- Identifies, authenticates and authorizes users or devices to the network

### Network Access Control (NAC)

- Prevents worm/virus infected devices from accessing the corporate network

### Control Plane Policing

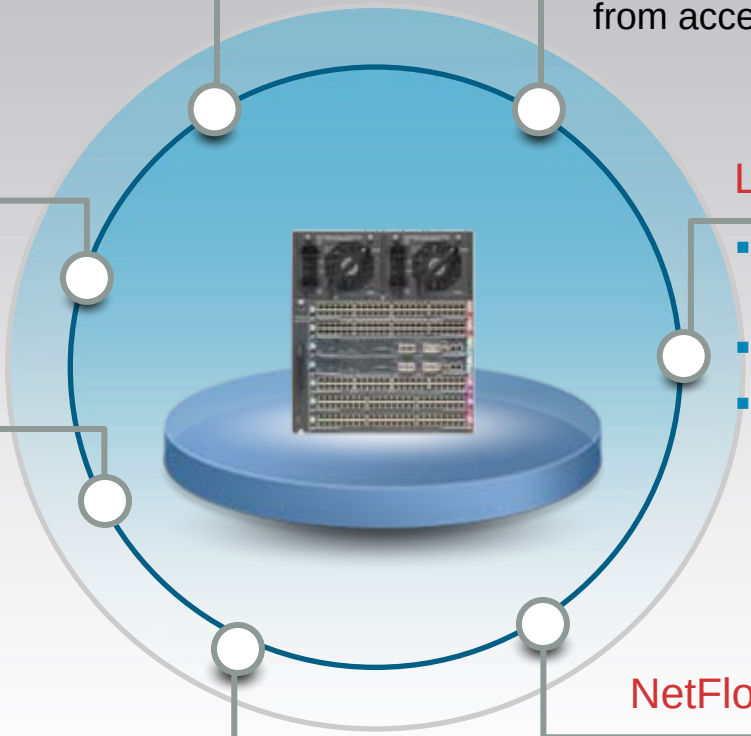
- Prevents CPU-based DoS attacks

### Layer 2 Attack Mitigation

- Prevent Man-in-the-middle attacks
- IP host spoofing
- Port security, dynamic ARP inspection, DHCP snooping, IP source guard

### uRPF

- Prevents Source IP
- Spoofing attacks



### Wirespeed ACLs

- Enforce security with RACL/PACL/VACL

### NetFlow

- Detect abnormal traffic patterns such as worms and DoS attacks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# Catalyst 4500 Identity Innovations

## Simplifying Identity Deployment

### Flexible Roll Out

- Ease of deployment with Flexible Auth: One configuration fits all
- Automated device profiling with NAC Profiler
- Rich policy enforcement options: VLAN (PVLAN, Guest, Auth Fail), Per-user ACL. ACS 5.0

### IPT Integration

- IP Telephony: Multi-Domain Auth, MAC move
- PXE boot: Open Access
- Shared Media Access Multi-auth

### Guest Access

- Central Web authentication
- Wired Guest Access Solution (NAC Guest Server)

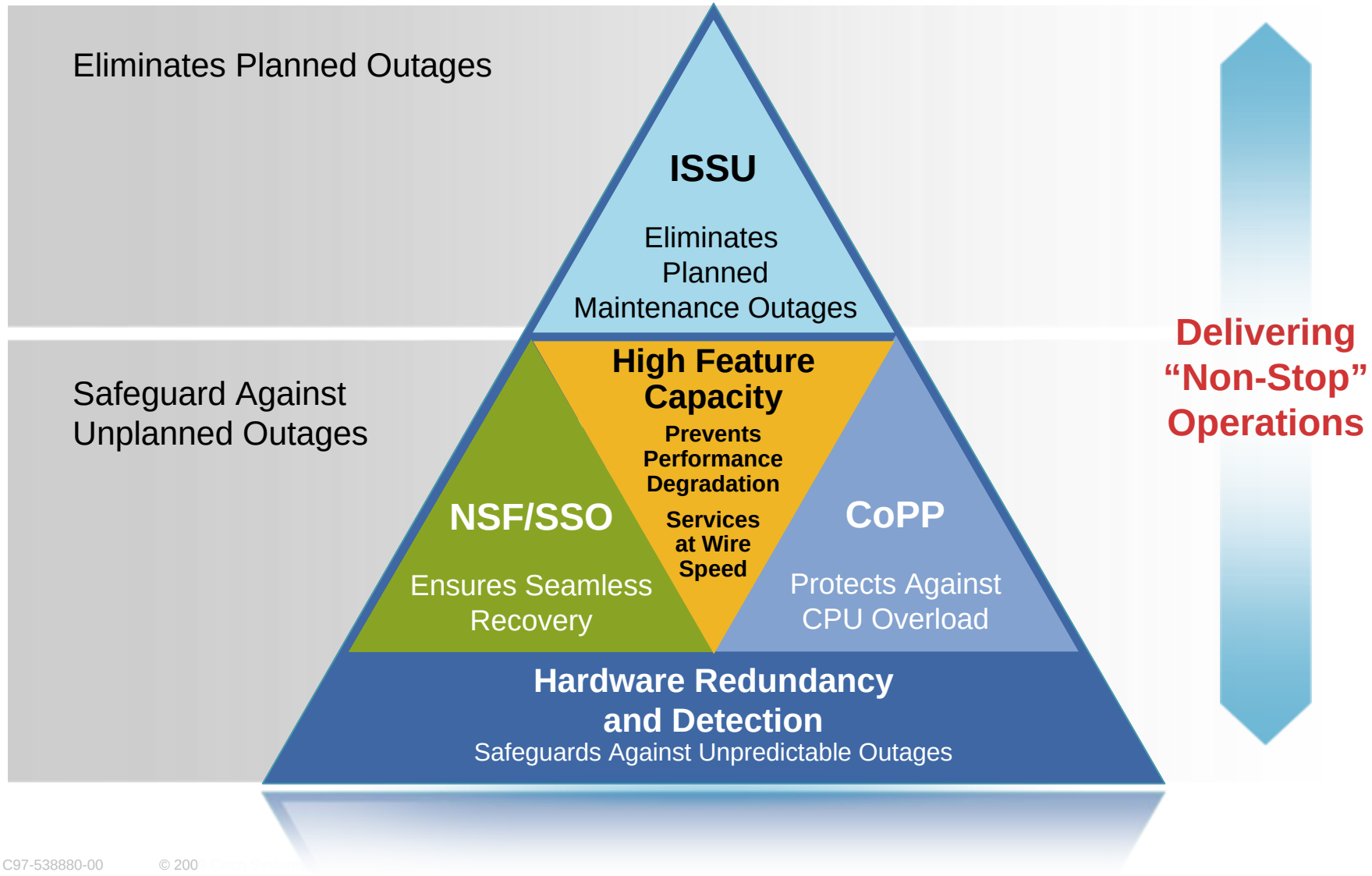
Available on Catalyst 4500 with IOS 12.2(50)SG

**Business Value**

- Simplified identity configuration
- Flexible roll out to support heterogeneous environment
- Minimum disruption to existing infrastructure
- Reduced operational cost

# Delivering Non-Stop Operations

## Full Image ISSU Maximizes Total System Availability

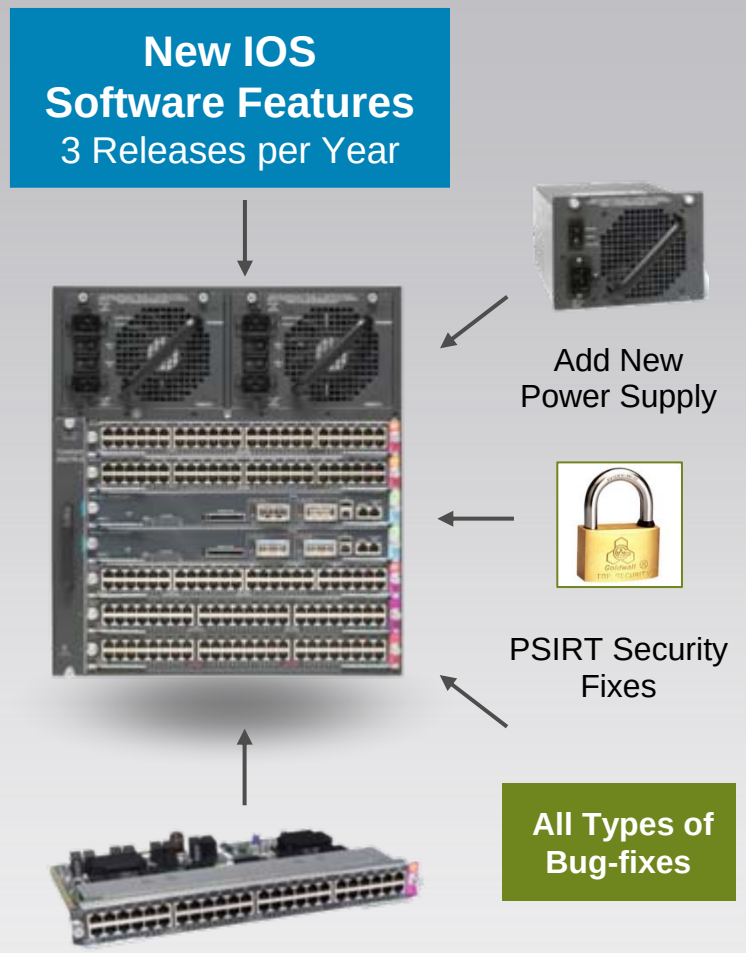


# Delivering Seamless Software Upgrade

## Full Image in Service Software Upgrade (ISSU)

### ISSU Allows Full IOS Image Upgrade Without Taking Switch out of Service!

- Comprehensive upgrade solution
  - Deployment of new features, hardware, services and maintenance fixes
- Virtually eliminate network disruption for software upgrade
  - Eliminate planned downtime windows
- Seamless to end users
  - Upgrades can be scheduled at anytime—don't have to plan an outage





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# Catalyst 4500 ISSU Case Study

## Medical Grade Network

### Challenge

- Need converged Medical Grade Network due to lack of infrastructure (closet space, cooling)
- Support critical patient monitoring application that carries vital signs

### Solution

- Leveraging existing investment with Catalyst 4500 at access and Catalyst 6500 at backbone
- Deployed Dual Sup with ISSU and SSO

### Benefits

- Highly resilient network with no service disruption even at planned downtime
- Reduced cost
- Improved patient care and services


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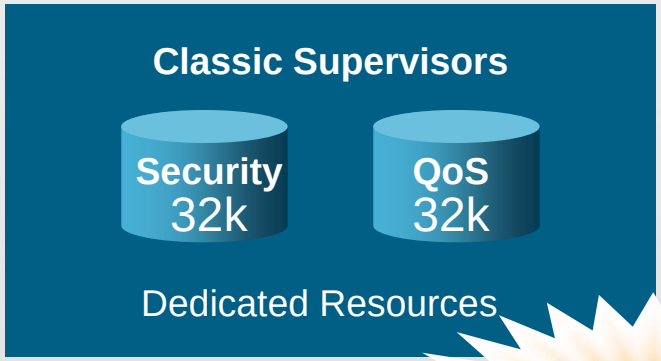
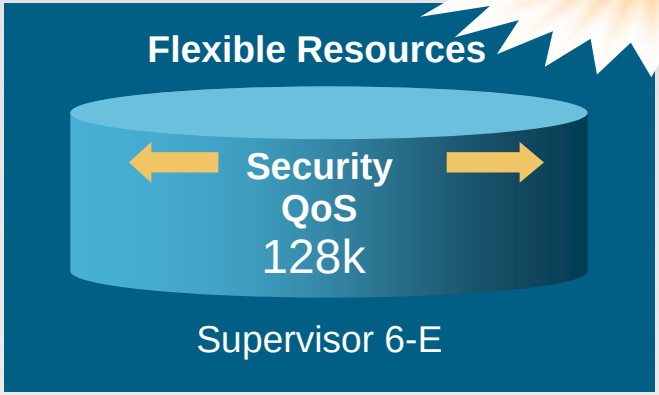
# Supervisor Engine 6E

## Scalable and Flexible Services Capacity



2X Capacity of Classic Sups




### Challenge

- Increasing services in the access—
- VoIP/Video/Security/Telepresence

### Solution

- Catalyst 4500 E-Series delivers
  - Two fold services capacity increase
  - Flexible TCAM resources

### Benefits

- Scale services as needed
- Service deployment flexibility
- Optimization for QoS/security policies
- Investment enhancement and protection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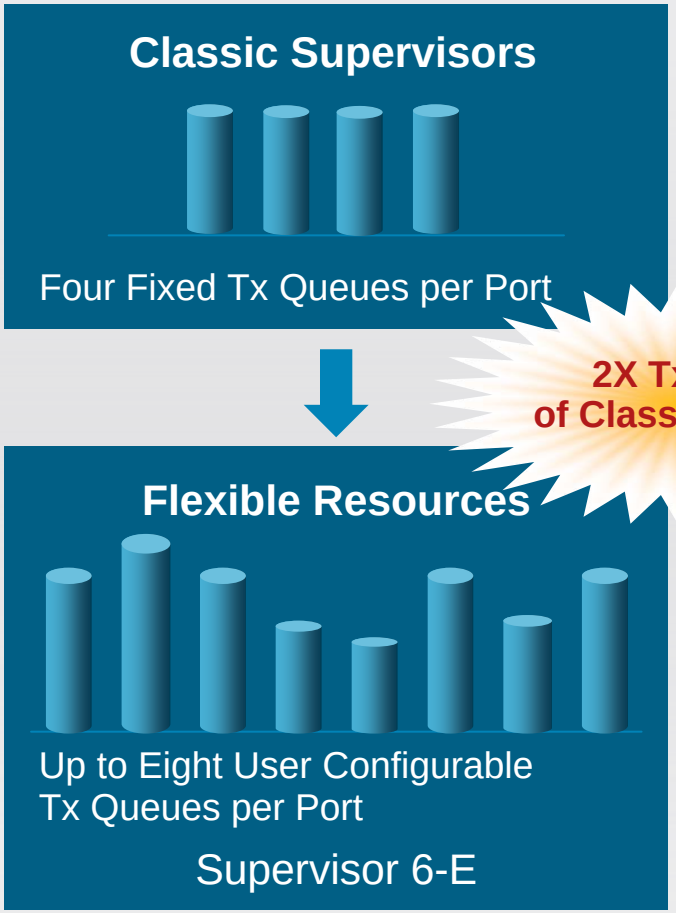
# Supervisor Engine 6E

## Flexible QoS Queuing Resources




### Challenge

- Increasingly diverse traffic types and patterns
- Static buffering approach limits network optimization
- Configuring queues

### Solution

- Flexible, user configurable per port level queues
- Queuing dynamically allocated based on configuration
- Unused resources can be assigned to any port
- Simplified queuing configuration, MQC compliant

### Benefits

- Fine-tune network for diverse applications
- Maximize network bandwidth and performance
- Enhance end user experience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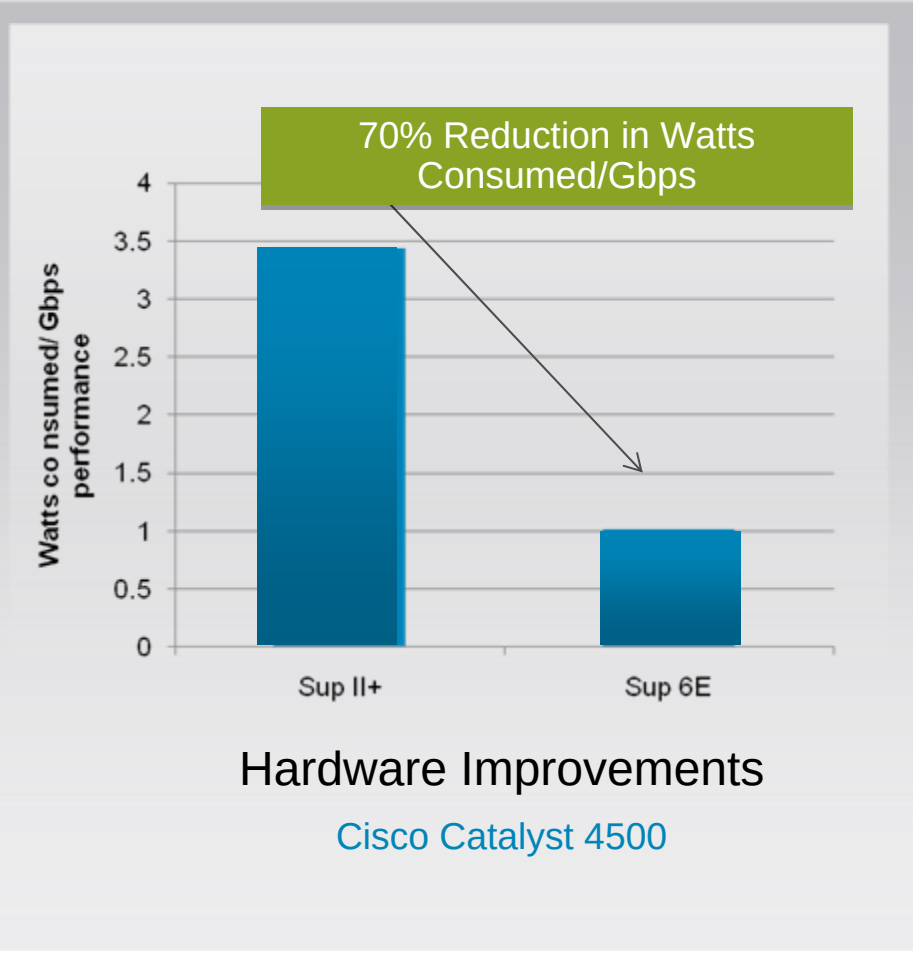
# Catalyst 4500 Supervisors

## Component Power Efficiency Gains

- Component upgrades deliver significant power/performance gains
- These component-based gains also extend the life of in-place systems
- Next Generation Catalyst 4500 modules will be able to measure power consumed real time and report via EnergyWise



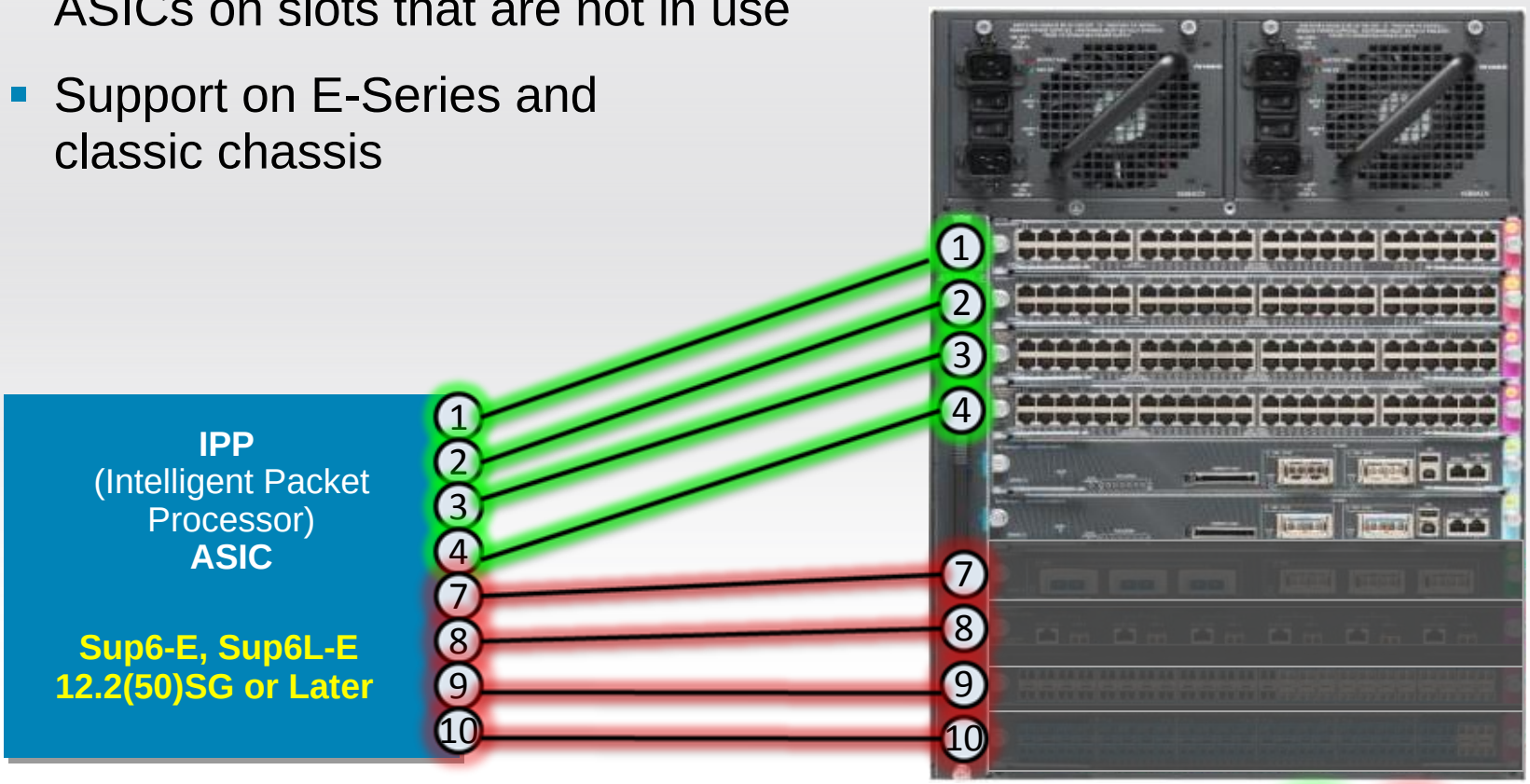

Visit the Cisco EBC Center to Pedal and Power the Catalyst 4500!

# Catalyst 4500 Catalyst Chassis

## Idle Slot Power Optimization

- Conserve power by turning off ASICs on slots that are not in use
- Support on E-Series and classic chassis

Example
WS-C4510R/WS-C4510R-E




The power saving behavior is automatic.
It is not triggered by CLI or visible as a user feature.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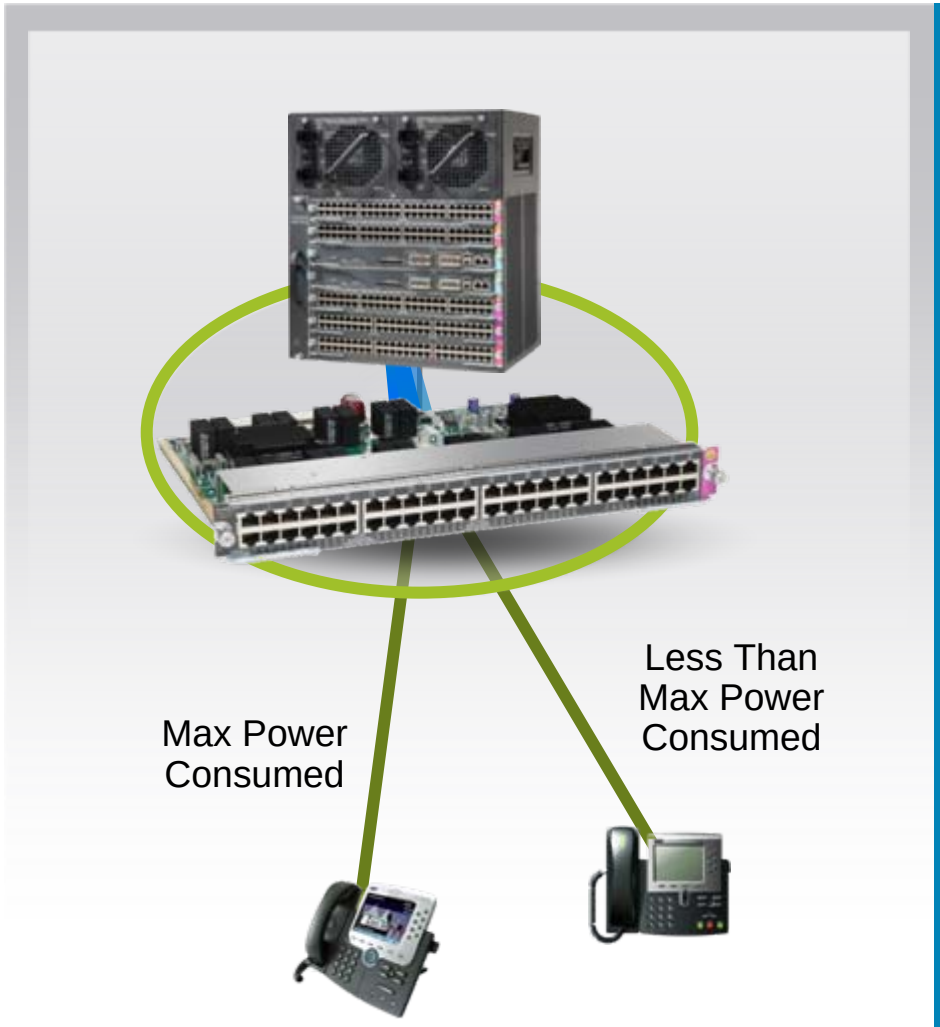
# Catalyst 4500 Linecards

## Intelligent PoE Delivery and Control




- PoE Monitoring lets you display the true power consumption of inline powered devices attached to the switch, so you have an idea of your actual power consumption
- PoE Policing protects a switch from faulty inline powered devices that may draw more current than they were designed for
- CDP and LLDP used to negotiate power per port
  - Allocation based on device needs
  - Maximize number of devices
  - Right-size the power supply

Available on Catalyst 4500 with IOS 12.2(50)SG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# Cisco EnergyWise

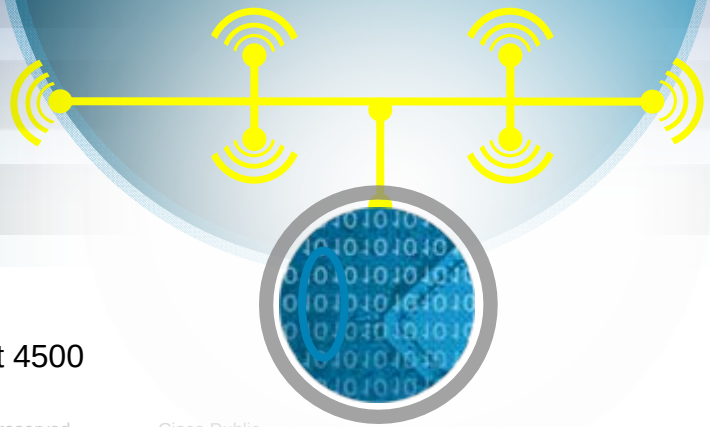
## Converge IT and Facility Networks

Tenant Services and Technologies
**IP-Based**

Building Services and Technologies
**Non-IP**

- High-Speed Internet
- Wireless
- VPN
- IP Telephony
- Audio & Video Conferencing
- Visitor Management
- Interactive Media
- Digital Signage

The Network Is the Platform



- Lighting
- Elevators
- 24/7 Monitoring
- HVAC Sensors
- Fire
- Video Surveillance
- Access
- Energy

Phase 1 available on Catalyst 4500 with IOS 12.2(52)SG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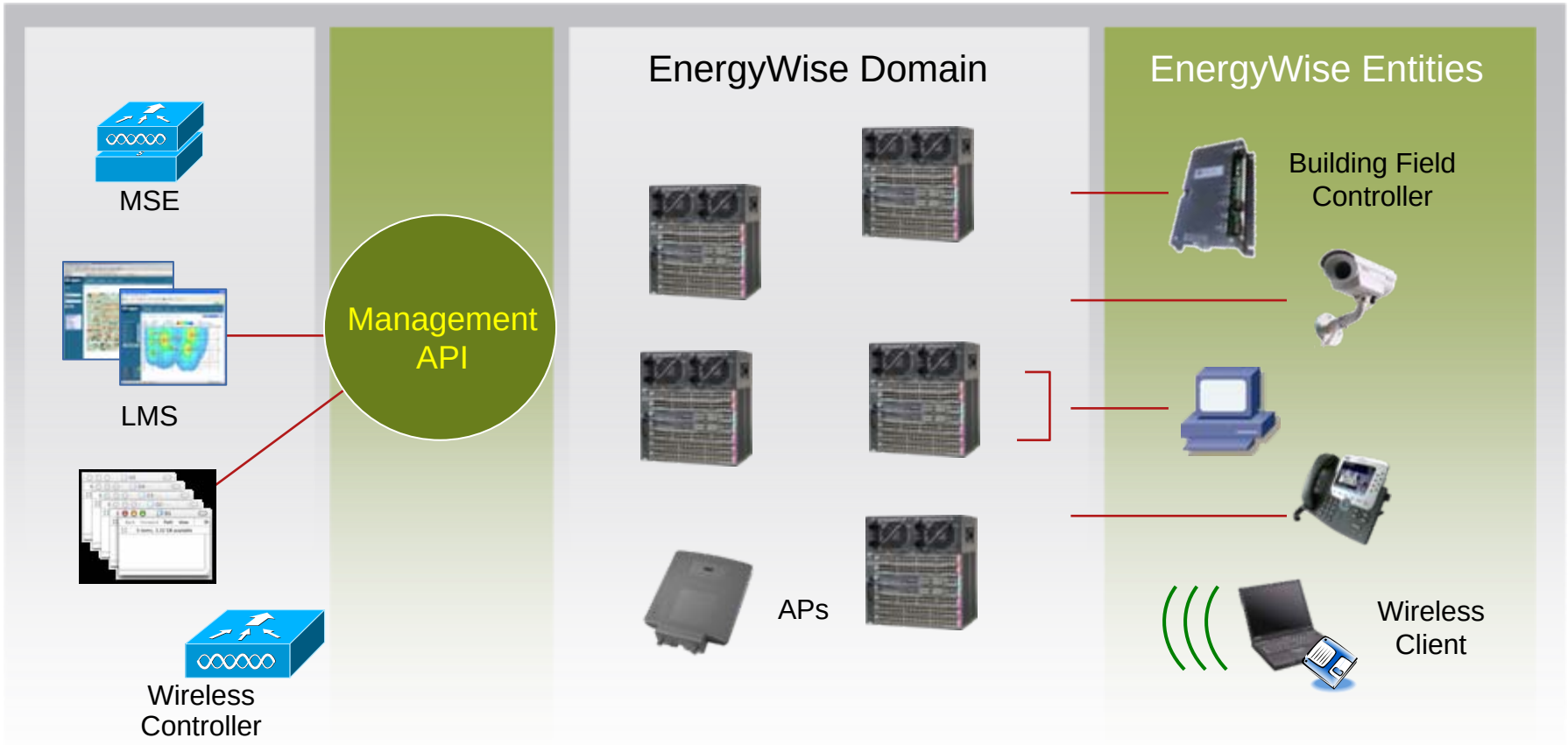
# Cisco EnergyWise Architecture




Management applications for IT or facilities

Switches and routers communicate through Mgmt API

Cisco network aggregates status and power measurements

Client Protocol communicates with end points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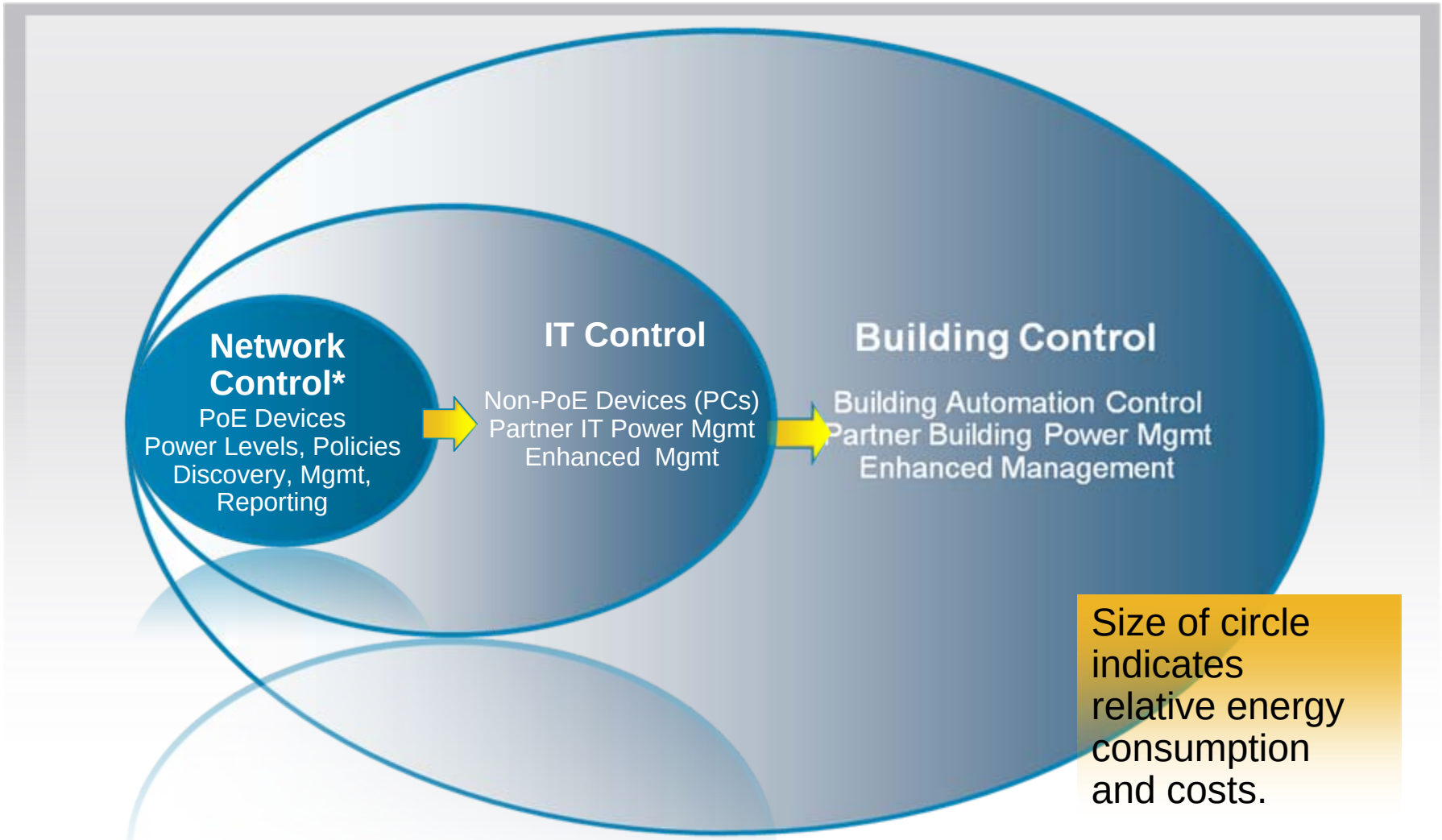
# Cisco EnergyWise

## Expanding Reach, Heightened Impact




Size of circle indicates relative energy consumption and costs.

*Phase 1 (Network Control) available on Catalyst 4500 with IOS 12.2(52)SG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# EEM (Embedded Event Manager)

Embedded Event Manager provides a means to automate the operational management in real time—EEM monitors for specific events on the switch and can invoke pre defined actions to correct, take remedial action and report the event to network operations…

Switch published event to event detectors

**IOS Event Detectors**

Application | CLI | Counter | Gold | I/F Counter | IOS Watchdog | None | OIR | Redundancy | SNMP | Sys Log | | Sys Moitor | Timer

**IOS Policy Director**

User coded scripts receive event notification and invoke pre-defined actions on switch

EEM Server passed event notification to the EEM Policy Director

**IOS Embedded Event Manager Server**

Receives notification of Switch Event from IOS Event Detector—passes event information to Policy Manager for Script Action

Available on Catalyst 4500 with IOS 12.2(46)SG


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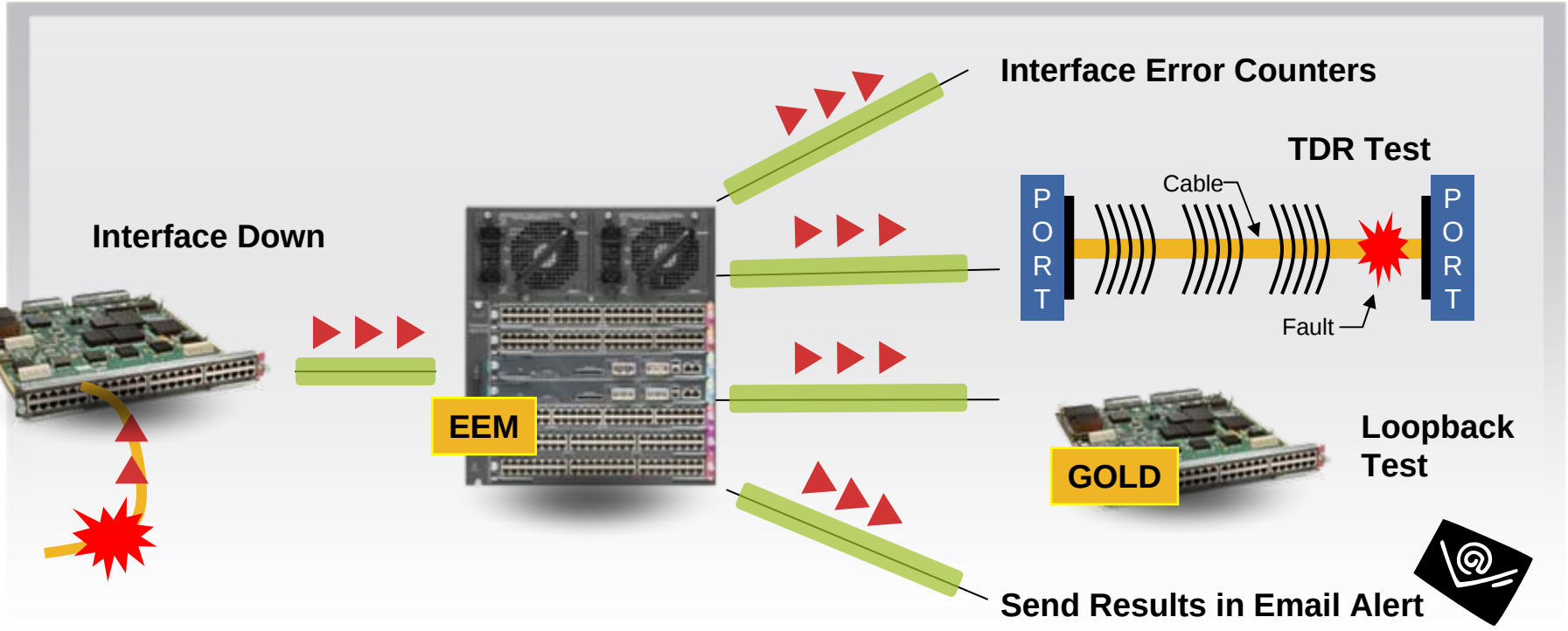
# Embedded Event Manager

## EEM Aplication Example

- Upon matching the provided SYSLOG message ‘LINK-3-UPDOWN’, the switch performs the following actions:
  - Display counter error statistics for the link that has gone down
  - Start a Time Domain Reflectometry (TDR) test
  - Start a GOLD Loopback test
  - Send the results using a provided template to a user-configurable address





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# Cisco Beyond—A Scripting Community for Embedded Event Manager

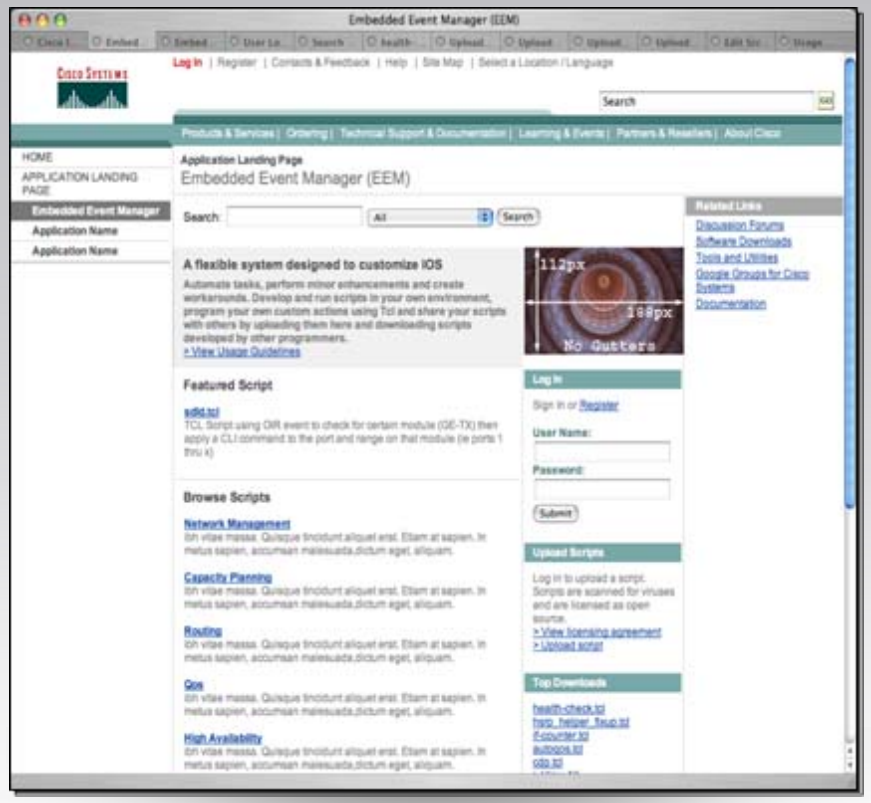
- Cisco IOS EEM

  Extremely flexible and powerful onboard, event driven, scripting facility

- Cisco Beyond

  A place to share scripts, upload, download, get examples

- On CCO!




More Details:
http://cisco.com/go/eem
http://www.cisco.com/en/US/products/ps6441/products_configuration_guide_book09186a008054dddf.html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# Smart Call Home

## A New Solution Available Now on the Catalyst 4500

- Proactive, real-time diagnostics and alerts
- Automatic generation of Cisco service requests
- Personalized web reports
- Secure, reliable data transport

www.cisco.com/go/smartcall

A Cisco SMARTnet Service Capability

Available on Catalyst 4500 with IOS 12.2(52)SG


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# Agenda

Campus Trends and The Cisco Network Fabric

Catalyst 4500 Hardware

Virtualization Update

Collaboration Update

Operations Update

Summary


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# Catalyst 4500-E Switch

## Addressing Business Needs Through Innovation

### Drives Virtualization

- Non-stop communications
- VRF-lite
- Desktop virtualization

### Enhances Collaboration

- PoE Plus ready 30W / port line cards
- Identity based security and flexible authentication
- NAC and TrustSec (software), CoPP
- Location services and mobility for wired/wireless
- Multicast and MediaNet services for video

### Optimizes Operations

- Energy efficiency
- Automatic management
- Low TCO


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